

WHAT IS CLAIMED IS:

1. A liner for covering a residual limb of an amputee comprising:
a sock-shaped fabric member; and

a stretch limiting element incorporated into an exterior surface of

5 the sock-shaped fabric member at a distal end portion thereof and formed of a material that has less elasticity than the sock-shaped fabric member such that the elasticity of the distal end portion is reduced to provide surface reinforcement and for limiting stresses of distal end elongation.

2. A liner for covering a residual limb of an amputee comprising:

10 a fabric liner body formed of at least two fabric pieces, one of the fabric pieces being a distal end piece that is attached to at least one other fabric piece along a circumferential edge of the distal end piece, the distal end piece being free of a transverse seam extending across the distal end piece; and

a coating formed of a material that is integrally adhered to an

15 exterior surface of a distal end region of an outer surface of the fabric liner body
for providing surface reinforcement thereat and for limiting stresses of distal end
elongation and rotation in a prosthetic socket.

3. The liner of claim 2, wherein the fabric member is formed of end and side pieces that are attached to one another along vertical

20 edges thereof, the distal end piece having an annular shape such that the distal

end piece is attached to one end of each of the first and second side pieces to produce a circumferential seam.

4. The liner of claim 3, wherein each of the first and second side pieces has an elongated generally rectangular shape.

5 5. The liner of claim 3, wherein the first and second side pieces are stitched to one another along the vertical edges thereof.

6. The liner of claim 3, wherein the distal end piece is attached to the first and second side pieces by a circumferential stitched seam.

7. The liner of claim 2, wherein the fabric member is formed of
10 at least two polymeric materials.

8. The liner of claim 7, wherein the fabric member is formed of a knit of polyester fibers and polypropylene fibers, the polyester fibers formed a first side of the fabric member and the polypropylene fibers forming a second side of the fabric member.

15 9. The liner of claim 8, wherein the coating is formed on the first side of the fabric member.

10. The liner of claim 2, wherein the material has a durometer hardness between about 10 to about 70 (Shore A) after the material is cured or sets to form the coating.

11. The liner of claim 2, wherein the coating is formed in a complete circumference around the distal end of the liner so as to distribute anti-elongation forces in a 360° manner.

12. The liner of claim 2, wherein the coating is confined to an area occupying a distalmost ½ inch to 4 inches of the fabric liner.

13. The liner of claim 2, wherein the material is a material selected from group consisting of: polyurethanes; liquid silicones; polyamides; rubber latices; and mixtures thereof.

14. The liner of claim 2, wherein the coating has a thickness from about 0.010 inch to about 0.090 inch.

15. The liner of claim 2, wherein the material comprises a material that can be applied under ambient conditions.

16. The liner of claim 2, wherein the coating is applied over one or more seams formed where the at least two fabric pieces are joined to one another.

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24. The liner of claim 23, wherein each strip has a generally rectangular shape.

25. The liner of claim 23, wherein each strip has a length between about 1 ½ inch and about 6 inch.

5 26. The liner of claim 2, wherein the coating comprises a plurality of discrete elongated strips of flexible material with one end of the strip terminating proximate or at an inner circumferential edge of a pin receptacle that is attached to the distal end of the fabric liner and an opposite end terminating along the fabric liner body.

10 27. The liner of claim 2, further including:

 a pin receptacle that is attached to the distal end of the liner body

on an exterior thereof, the pin receptacle including a skirt surrounding a

receptacle body with the coating being applied on the exterior of the skirt and

onto the distal end region of the fabric liner anywhere from a distance between

15 about 1 ½ inch to about 4 inch above an upper peripheral edge of the pin

 receptacle.

28. A liner for covering a residual limb of an amputee, the liner comprising:

a fabric liner body having formed of at least two fabric pieces, one

20 of the fabric pieces being a distal end piece that is attached to at least one other

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a coating formed of a material that is integrally adhered to an exterior surface of a proximal end region of an outer surface of the fabric liner body for providing surface reinforcement thereat and for limiting circumferential stretch of the fabric liner body, the coating having limited flexibility and extends along at least a partial circumference of the fabric liner body.

31. The liner of claim 30, further including:

a stretch limiting element that is adhered to a distal section of the liner body; the stretch limiting element being formed of a coating that has limited flexibility and is integrally adhered to an outer surface of the fabric liner body for providing 360° of surface reinforcement of the fabric liner as well as distributing anti-elongation forces in a 360° manner.

32. A method of providing surface reinforcement at a distal end of a liner for covering a residual limb of an amputee and for limiting stresses associated with distal end elongation of the liner, the method comprising the steps of:

providing the liner which comprises a fabric liner body including an open end and a closed distal end; and

applying a material to a distal end region of the fabric liner body to form a coating that has limited flexibility and is integrally adhered to the fabric

liner body to form an anti-elongation coating on an exterior surface of the liner,
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the coating having a hardness between about 10 and about 70 durometer (Shore A).

33. The method of claim 32, further including the step of:

disposing the liner on an outer surface of a rotatable mandrel prior

5 to applying the coating; and

rotating the mandrel as the material is applied to the fabric liner

body.

34. The method of claim 33, wherein the mandrel is rotated at a

speed between about 20 and about 60 RPM.

10 35. The method of claim 32, further including the step of:

masking the fabric liner body to define an exposed area where the

material is to be applied to form the coating.

36. The method of claim 35, wherein the step of masking the

fabric liner body includes the step of placing a mask material 360° around the

15 fabric liner body.

37. The method of claim 35, wherein the step of masking the

fabric liner body includes the step of placing a mask material 360° around the

fabric liner body so that up to a bottommost 6 inches of the fabric liner body is exposed.

38. The method of claim 32, wherein the step of applying the material comprises the step of:

placing the material 360° around the fabric liner body so that the resulting coating extends 360° around the fabric liner body.

5 39. The method of claim 32, wherein the step of applying the material comprises the step of:

applying the material with sufficient pressure to cause the material to seep into the interior of the fabric liner body resulting in the coating being integrally adhered to the fabric liner body.

10 40. The method of claim 39, wherein the step of applying the material comprises the step of:

providing an applicator;

disposing an amount of the material on a selected portion of the fabric liner body;

15 rotating the fabric liner body; and

applying a force with the applicator against the material to cause the material to seep into the interior of the fabric liner body and into any seams of the fabric liner body.

41. The method of claim 40, wherein the applicator comprises a
20 squeegee.

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comprises a flexible member.

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thickness;

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curing the material to form the coating.

46. The method of claim 32, wherein the step of providing the fabric liner body includes the step of:

5 attaching a pin receptacle on the distal end of the fabric liner body,
the pin receptacle including at least a partially flexible skirt portion.

47. The method of claim 32, wherein the step of applying the material includes the step of:

applying the material circumferentially about the skirt portion and

10 the distal end region of the fabric liner body.

48. The method of claim 32, wherein the step of providing the fabric liner body includes the steps of:

providing at least two fabric pieces, one of the fabric pieces being a distal end piece; and

15 attaching the distal end piece to at least one other fabric piece
along a circumferential edge of the distal end piece, the distal end piece being
free of a transverse seam extending across the distal end piece.

49. The method of claim 32, wherein the fabric liner body is formed of first and second side pieces that are attached to one another along

50. The method of claim 32, wherein the fabric liner body is formed of a knit of polyester fibers and polypropylene fibers, the polyester fibers formed a first side of the fabric liner body and the polypropylene fibers forming a second side of the fabric liner body.

51. An automated method of providing surface reinforcement at a distal end of a liner for covering a residual limb of an amputee and for limiting stresses associated with distal end elongation of the liner, the method comprising the steps of:

providing the liner which comprises a fabric liner body including an open end and a closed distal end;

rotating the liner; and

selectively applying a material to a distal end region of the fabric liner body with an automated applicator to form a coating that has limited flexibility and is integrally adhered to the fabric liner body to form an anti-elongation coating on an exterior surface of the liner, the coating having a hardness between about 10 and about 70 durometer (Shore A), wherein the automated applicator has a flexible applicator body for pressing the material

against the fabric liner body and a plurality of ports formed therethrough for selectively discharging the material, the applicator having an on-off switch to permit selective discharge of the material.